Sheep Creek Vegetation Management Project- Existing Condition

Wildlife Specialist's Report

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Introduction

This analysis describes terrestrial wildlife species found within the Sheep Creek project area and other relevant scales and the potential effects of the Sheep Creek alternatives on these species. Rather than addressing all wildlife species, discussion focuses on Forest Plan management indicator species (MIS), threatened, endangered and sensitive (TES) species, Forest Plan featured species, and landbirds (see individual species lists below). Existing conditions are described for each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. Supporting wildlife documentation is located the Project Record, and includes detailed data, methodologies, analyses, conclusions, maps, references and technical documentation used to reach conclusions in this environmental analysis.

Regulatory Framework

The three principle laws relevant to wildlife management are the National Forest Management Act of 1976 (NFMA), the Endangered Species Act of 1973 (ESA), and the Migratory Bird Treaty Act (MBTA) of 1918 (as amended). Direction relative to wildlife is as follows:

- NFMA requires the Forest Service to manage fish and wildlife habitat to maintain viable populations of all native and desirable non-native vertebrate wildlife species and conserve all listed threatened or endangered species populations (36 CFR 219.19).
- ESA requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the US Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species.
- MBTA established an international framework for the protection and conservation of migratory birds. This Act makes it illegal, unless permitted by regulations, to "pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird."

Forest Service Manual (FSM) direction provides additional guidance: identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species (FSM 2670.31 (6)).

The Forest Service Manual also directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. Under FSM 2670.32, the manual gives direction to analyze the significance of adverse effects on a species habitat or population within the area of concern, and on the species as a whole.

The principle policy document relevant to wildlife management on the Forest is the Wallowa-Whitman Land and Resource Management Plan (USDA Forest Service 1990), referred to as the Forest Plan for the remainder of this analysis. The Forest Plan provides standards and guidelines for management of wildlife species and habitats. Standards and guidelines are presented at the Forest level (LRMP, pp. 4-18 to 4-56) or Management Area level (LRMP pp. 4-56 to 4-98).

The 1995 Regional Forester's Eastside Forest Plan Amendment #2 (Eastside Screens) amended Forest Plans for the National Forests in Eastern Oregon and Eastern Washington, including the Wallowa-Whitman National Forest. Amendment # 2 established interim wildlife standards for old growth, old growth connectivity, snags, large down logs, and Northern Goshawks. The Regional Forester has periodically distributed letters clarifying direction in Amendment #2 (Regional Forester, October 2, 1997; October 23, 1997; and June 11, 2003).

Additional management direction provides for conservation of migratory landbirds. This direction is consolidated in the Forest Service Landbird Strategic Plan and further developed through the Partners in Flight Program. The Oregon-Washington Partners in Flight Conservation Strategy for Landbirds in the Rocky Mountains of Eastern Oregon and Washington (Altman and Bressen 2017) identifies priority habitats, and focal species and habitats for the Blue Mountains of Oregon.

Analysis Methods

Different scales of analysis are used to analyze the effects of the treatment activities on wildlife, and include the following:

- Sheep Creek Project Area perimeter at 29,952 acres on National Forest System lands.
- The watershed scale provides a systematic way to understand and organize ecosystem information
- Forest scale at which population viability is assessed
- Blue Mountains Ecological Province
- The cumulative effects area encompassing the Sheep Creek Project Area varies by species and is described within sections dedicated to individual species analyses.

The project area boundary occurs within the Upper Grande Ronde watershed. Management Indicator Species population viability assessments have been conducted for Pacific marten, Pileated Woodpecker, and Northern Goshawk at the Blue Mountains and Wallowa-Whitman National Forest scales (Wales 2011a,Wales 2011b, Wales2011c).

Existing condition describes each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. We disclose incomplete or unavailable information and scientific uncertainty where applicable.

Management Indicator Species (MIS)

The geographic ranges of MIS are larger than the project area, thus the analysis of habitats for viable populations of MIS needs to be done at a scale larger than the individual project. "Habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species generally throughout its current geographic range" (FSM 2620.1). Provisions for contributing to viable populations are determined at the level of the Forest Plan through management requirements, goals and objectives, standards, guidelines, prescriptions, and mitigation measures to ensure that habitat needs of MIS will be met during plan implementation at the project level (FSM 2621.4). Analysis for each MIS includes an assessment of consistency with the provisions identified in the Forest Plan. Cumulative effects of proposed management activities on habitat capability for MIS are evaluated (FSM 2620.3) and we use best available science in this analysis in assessing project impacts.

Analysis Tools and Surveys

Species presence/absence determinations are based on habitat presence, current surveys, past wildlife surveys, recorded wildlife sightings, the Oregon Natural Heritage Information Center wildlife sightings database (2008), scientific literature, and status/trend and source habitat trend documented for the Interior Columbia Basin (Wisdom et al. 2000).

Vegetation analysis and estimates of stand conditions used silviculturist field data, aerial photo interpretation, vegetation database, and/or ground reconnaissance.

Analysis Methodology

Alternative 1, the No Action Alternative is used as a benchmark to compare and describe the differences and effects between taking no action and implementing action alternatives. The No Action Alternative represents the existing condition; resource conditions are then projected forward in time to estimate resource changes expected in the absence of the proposed management activities.

Effects on species will be determined by assessing how the No Action Alternative and action alternatives affect the structure and function of vegetation relative to current and historical distributions. Some wildlife habitats require a detailed analysis and discussion to determine potential effects on a particular species. Other habitats may either not be impacted or are impacted at a level which does not influence the species or their occurrence. The level of analysis depends on the existing habitat conditions, the magnitude and intensity of the proposed actions, and the risk to the resources.

Management indicator species (MIS)

The LRMP identifies five wildlife species, or groups of species, as MIS (Table 1) (US Forest Service 1990). These species serve as indicators of the effects of management activities by representing habitat for a broad range of other wildlife species. We assume that habitat requirements of MIS represent those of a larger suite of species using the same type of habitat. All MIS are present in the project area.

Table 1. MIS and their primary habitats.

Species	Habitat

American marten	Old-growth and mature forest
Northern Goshawk	Old-growth and mature forest
Pileated Woodpecker	Old-growth and mature forest
Primary cavity excavators[1]	Snags and logs
Rocky Mountain elk	Cover and forage

[1] Northern Flicker; black-backed, downy, hairy, Lewis', three-toed, and white-headed woodpeckers; red-naped and Williamson's sapsuckers; black-capped, chestnut-backed, and mountain chickadees; and pygmy, red-breasted, and white-breasted nuthatches

Rocky Mountain Elk

Rocky Mountain elk are an indicator of habitat diversity, interspersion of cover and forage area, and security habitat provided by areas of low human disturbance. Elk management on the Wallowa-Whitman National Forest is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU). The Sheep Creek project lies within the Starkey WMU.

Background

Rocky Mountain elk (*Cervus canadensis nelson*- hereafter elk) are an important big game species in northeastern Oregon (Csuti et al. 2001) and are an indicator of the quality and diversity of forested habitat (defined as $\geq$ 40% canopy closure, USDA LRMP 1990). Other big game species (i.e. mule deer, white-tailed deer, black bear, and cougar) as well as many non-game species are at least partially accommodated when high quality elk habitat is present. Elk exploit a variety of habitat types in all successional stages and their patterns of use change daily and seasonally (Ager et al. 2003). Summer diet consists of deciduous shrubs (Cook et al. 2016), graminoids, and forbs (Faber 2017). In winter, elk select for graminoids, browsing on woody plants if available forage and winter severity reduce access to grazing (Christianson and Creel 2007). They are responsive to land management activities, thus the density or health of elk populations (as opposed to examining population trends) most likely indicate the effectiveness of elk management. (Toweill and Thomas 2002).

Two major factors contributing to elk habitat quality are cover/forage and open roads – these factors are discussed throughout the elk section of this report. Thinning and prescribed fire result in an increase in available forage (Long et al. 2008), but Cook (et al. 2016) found that merely thinning mid-seral stands was not an effective to increase forage. Habitat management activities must reset stands to an early seral stage to increase forage quantity and quality for elk. Displacement of elk from areas during intensive management activities is well documented, but research shows the displacement is temporary (Toweill and Thomas 2002, Wisdom et al. 2005).

Increased road densities significantly reduces elk security habitat (Toweill and Thomas 2002, Ranglack et al. 2017), increases individual stress levels (Creel et al. 2002), increases elk vulnerability from legal and illegal hunter harvest (Rowland et al. 2005), and changes the distribution of elk populations across the landscape (Ciuti et al. 2012, Wisdom et al. 2005). These factors will be revisited in the discussion of the direct and indirect effects of each alternative.

Blue Mountain/Wallowa-Whitman Population Viability

The National Forest Management Act (1976) requires land managers to provide sufficient habitat to provide for viable populations of all native and desired non-native vertebrates. As a game species, elk are managed on a management objective (MO) basis. Management objectives were developed to consider not only the carrying capacity of the lands, but also the elk population size that would provide for a huntable surplus, and tolerance levels of ranchers, farmers, and other interests that may sometimes compete with elk for forage and space. Biologically, a population that is managed around a MO is much larger than the smallest population size that can persist over the long term. Elk populations on the Wallowa-Whitman are regulated by hunting and predation.

Methods

We use a habitat effectiveness index (HEI; Thomas et al. 1988) assessing the quality of elk habitat at the project area level. This model considers the density of open roads, the availability of cover habitat, the distribution, and juxtaposition of cover and forage, and forage quantity and quality. Forage data is unavailable for this project area and is omitted from the total HEI value. This report also employs the use of distance band analysis (DBA) to determine the effects of roads on elk security habitat (Rowland et al. 2005). The impacts of OHV's on closed roads and cross-country travel are not considered in an HEI analysis, although they likely cause reduction in habitat effectiveness. Additionally, a discussion of the best available science accompanies the results.

Existing Condition

The Sheep Creek project area falls within the Starkey WMU (ODFW) contained within the Wenaha-Snake Zone. Elk populations in the province increased in the 1970's to near the management objective of 5,300. This increase is due to increased forage production created by timber harvest, improved livestock management, and conservative antlerless harvest. From the 1980's to current, the population has fluctuated near the management objective. Currently, the population is at 76.4%. of the MO and trending just below the MO of 5300 since 2017.

The Forest Plan establishes standards for wildlife habitat, and more specifically elk habitat on the Forest. The Sheep Creek analysis area, 29,935 acres in size, providing year-round habitat for big game. Over 80% of the project area is elk summer range; 7,482 acres MA1W and 17,828 acres are designated MA1, which emphasizes wood fiber production while meeting needs for animal forage and recreation. Less than a quarter of the project area is considered winter habitat; 3,744 acres of MA3 and 101 acres MA3A, managed for timber production with a special emphasis on optimal cover and forage for big game species. High security habitat, located greater than 1.5 miles from a road, is minimal (23 acres) and located at the far southern end of the project area.

Cover: Forage Ratio – A cover: forage ratio is used to describe the relative amounts of stands with >40% cover to stands <40% cover. The optimal ratio of cover to forage is 40:60 (Thomas 1979), but the LRMP establishes a minimum standard that at least 30% of forested land be maintained as cover (>40% canopy closure). Per Thomas 1988, cover refers to any combination of satisfactory cover (a stand of coniferous trees with >70% canopy closure) and marginal cover (a stand of coniferous trees with 40-70% canopy closure). Forage habitat is less than 40% canopy cover. Research has shown that this definition of cover may not be precise - not all stands with cover >70% are satisfactory in terms of elk forage and energy expenditure (Cook et al. 1995).

The existing cover: forage ratio in this project area is 50.6:49.4. This ratio exceeds the LRMP standard, suggesting a shortage of forage habitat. Stand data was collected in the early 80's and the ratio may misrepresent the cover: forage analysis area based on changed conditions due to disturbances or seral progression.

Cover Quality – Forests stands with relatively closed canopies function as thermal and security cover, providing a visual barrier from predators, and may reduce the effects of ambient temperature, wind, and long and short wave radiation functions on energy expenditure (i.e. increased metabolic rates) in elk (Thomas 1979, Thomas 1988). Although the benefits to elk of "thermal cover", in the true sense of the word, has been questioned (Cook et al. 1995, Cook et al. 1998, Bender and Cook 2005), the intent of the standard in managing elk habitat remains credible in that habitat attributes can be influential to energy balances by affecting forage quality and quantity, and mediating energy expenditures associated with travel and harassment (Bender and Cook 2005). By implementing the current "thermal cover" standard, resource managers are providing physical barriers that minimize the negative effects of human disturbance.

There are 2,340 acres (8%) of satisfactory cover, 12,671 acres (43%) of marginal cover and 14,667 acres (49%) of forage habitat within the analysis area resulting in a cover quality value of 0.58 (Table 3).

Size and Spacing – Thomas et al. (1979) suggest that size and spacing of cover and forage habitat is a key to elk use of forested habitat, and this assumption was verified by Leckenby (1984) in the Blue Mountains of northeastern Oregon. Size and spacing of habitat is considered optimal when cover to forage edge widths are between 100-200 yards (Thomas et al. 1988). Considering an HE value of 1 is optimal, an HE size and spacing value of 0.65 (Table 3) indicates that forage to cover ratios within the analysis area is acceptable.

Open Roads – Excessive open road densities have deleterious effects on habitat effectiveness by taking land out of production (1 road mile equals 4 acres of land), reducing the effectiveness of cover and increasing disturbance to elk (Rowland et al. 2005). The existing average open road density within the Sheep Creek analysis area is 2.13 mi/mi^2 (Table 3). 17,828 acres are designated MA-1 (intensive timber management) and covers the majority of the project area. The average open road density of 2.13 mi/mi^2 is lower than the forest plan guideline of 2.5mi/mi^2 for MA-1. This road density estimate does not take into account off-road vehicle use on OHV trails, cross-country travel, and closed roads.

An important finding from the Starkey Experimental Forest and Range studies is that road density is not the best predictor of habitat effectiveness for elk. Instead, a method using distance bands proved to be a more useful tool for assessing effects from roads. Road densities do not provide a spatial depiction of how roads are distributed on the landscape (Rowland 2005), but a distance band analysis (DBA) does. A DBA uses GIS to draw concentric bands around motor vehicle routes until the entire area of interest (in this case the Sheep Creek analysis area) is occupied by these bands. The distance band closest to motor vehicle routes (within one half mile) provides the least secure habitat for elk. As a result, elk choose to spend less time within one half mile of motor vehicle routes. As distance from motor vehicle routes increases, so does habitat effectiveness for elk. Elk find more security from human disturbance further from motor vehicle routes. moderate quality security habitat occupies the area between one-half and one mile from a road, and high security habitat occupies areas farther than 1.5 miles from a road.

For this analysis, the percentage of the landscape within each distance band was used as a means of comparing alternatives with regard to the effects of motor vehicle disturbance to elk. Existing conditions demonstrate 8.3% of habitat as moderate to high security and 91.8% of habitat as low security (Table 4). The North Fork John Day Wilderness, immediately to the southwest of the project area, may provide a suitable amount of secure habitat in the general vicinity.
Habitat Effectiveness Index Results–The existing condition HEI values are 0.60 (road density analysis; Table 3) and 0.51 (distance band analysis; Table 3). Minimal satisfactory cover (canopy cover >70%), road density, and lack of secure habitat contribute to low HEI values.

Table 2 – Although treatments in each alternative would affect cover type differently, the overall differences between alternatives are minimal.

	Existing Condition	
Cover and Forage Classification	**Acres**	**% of Total**
Forage acres (< 40% canopy cover)	14,667	49.4
Marginal Cover acres (> 40%, < 70% canopy cover)	12,671	42.7
Satisfactory Cover acres (< 70% canopy cover)	2,340	7.9

Table 3. Habitat-effectiveness index calculations for elk habitat existing conditions within the Sheep Creek analysis area[1]

Habitat Effectiveness Variable	Habitat Effectiveness Value (Optimal = 1.0)	Comments
HE Cover	0.58	Amount of satisfactory cover relative to marginal cover
HE Size and Spacing	0.65	Mosaic of cover and forage, 50.6:49.4
HE r value using road density	0.47	Open road density 2.13 mi/mi sq LRMP MA-1 ≤ 2.5 mi/mi sq
HE r value using distance bands	0.36	Concentric bands around open roads
Total HEI using road density[1]	0.60	LRMP MA-1 ≥ 0.5 HEI
Total HEI using distance band analysis*	0.51	LRMP MA-1 ≥ 0.5 HEI
Percent of area ≥ 0.5 mi from open motorized route	0.08	Security habitat

[1] HEI calculations do not include a forage variable because current, reliable forage data are not available

Table 4. Distance of habitat from open roads within the subwatersheds that comprise Sheep Creek Project unit. Moderate and high security habitat are preferred for elk management. No difference in road management between Proposed Alternatives 2 and 3 resulted in identical distance band analysis results.

Distance Bands by Subwatershed		
Sheep Creek:	**Existing Condition**	
Distance (miles)	**Acres**	**% of Total Area**
0.5 mi (low security)	17654	93.0
1 mi (moderate security)	1300	6.9
1.5 mi (high security)	23	0.1
Chicken Creek:	**Existing Condition**	
Distance (miles)	**Acres**	**% of Total Area**
0.5 mi (low security)	9829	89.6
1 mi (moderate security)	1146	10.4
1.5 mi (high security)	0	0.0
Combined (Entire Project Area):	**Existing Condition**	
Distance (miles)	**Acres**	**% of Total Area**
0.5 mi (low security)	27484	91.8
1 mi (moderate security)	2446	8.2
1.5 mi (high security)	23	0.1

Direct/Indirect Effects

ALTERNATIVE 1

There will be no immediate direct or indirect adverse effects to elk cover and forage from Alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. The no action alternative would maintain current conditions for elk habitat in the short-term (0-20 years). How elk habitat changes in the mid to long-term (beyond 20 years) would depend largely on the occurrence and scale of disturbances (wildfire, insect, or disease), stressors (drought, global climate change), and changes in management of travel and hunting. These events cannot be predicted with a reasonable level of certainty, but risks associated with forgoing management actions can be described.

Cover-Forage

As described in Existing Conditions, there are 2,340 acres (8%) of satisfactory cover, 12,671 acres (43%) of marginal cover and 14,667 acres (49%) of forage habitat within the project area (Table 2). A study conducted by Wisdom and Rowland (2020) found that elk use is highest at 35% canopy cover, roughly 40% of the Sheep Creek Project Area. Recent research demonstrates that timber stands in the Southern Blue Mountains, regardless of potential vegetation group (PVG) or moisture regime, are 273-316% more dense and contain 60-176% higher basal area currently than in the late 1800s (Johnston et al. 2018).

Data supports that this no action scenario could result in a higher risk of tree mortality exists due to increased competitive stress, insect outbreaks, fuel loading, and associated increases in fire severity and crown fire spread (Hessburg and Agee 2003, Spies et al. 2006, Keane et al. 2018). Landscapes that better reflect HRV result in mixed severity fires, creating a patchy mosaic of cover types beneficial to elk. Large scale, severe-intensity fire (a result of no action) would degrade elk habitat through a loss of habitat in the near-term, and a reduction in edge habitat between cover and forage areas in the long-term.

Security

As described in the Existing Conditions, 8.3% of habitat is moderate to high security and 91.8% of habitat is low security (Table 4).

Habitat Effectiveness Index Results

The HEI values for Alternative 1 are identical to the Existing Condition results. They are 0.60 (road density analysis; Table 3) and 0.51 (distance band analysis; Table 3).

ALTERNATIVES 2 AND 3

Cover-Forage

Existing conditions demonstrate a surplus of cover with limited forage. All action alternatives meet or exceed LRMP standards for amount of stands with cover >40%. Cook (et al. 2005) found that dense cover did not benefit elk and that land managers effort is better spent improving forage quantity and quality. This is accomplished by creating stands <40% cover and setting them back to an early seral stage (Cook et al. 2016).

Action alternatives would affect elk habitat with 11,598 acres treated in Alternative 2 compared to 7,368 acres treated in Alternate 3. Alternative 3 eliminates prescriptions that remove the highest basal area, commercial treatments in RHCAs, and commercial harvest in corridors of connectivity, all implemented in Alternative 2. Both will reduce satisfactory and marginal cover, but this will in turn improve the arrangement of forage and cover. Commercial harvest would generally increase available elk forage by reducing canopy cover. Overall changes in cover are similar regardless of alternative (Table 5).

Post-treatment tree densities are expected to be variable, consisting of dense patches interspersed with open areas, but commercial thinning will overall convert marginal cover to forage. The amounts of forage, marginal, and satisfactory cover remaining under each alternative does not reflect the finer scale mosaic of cover types that result from thinning prescriptions.

Table 5 – Although treatments in each alternative would affect cover type differently, the overall differences between alternatives are minimal.

	Existing Condition		Alternative 2		Alternative 3	
Cover and Forage Classification	**Acres**	**% of Total**	**Acres**	**% of Total**	**Acres**	**% of Total**
Forage acres (< 40% canopy cover)	14,667	49.4	16,177	54.5	15,450	52.1
Marginal Cover acres (> 40%, < 70% canopy cover)	12,671	42.7	11,486	38.7	12,218	41.2
Satisfactory Cover acres (< 70% canopy cover)	2,340	7.9	2,019	6.8	2,009	6.8

Security

The HEI model developed by Thomas et al. 1998 relies on open road density as an indicator of relative effects from roads on elk habitat. More recent research in northeastern Oregon found that road density is a poor indicator of habitat effectiveness (Rowland et al. 2000). In contrast to Thomas et al., this study described a strong linear increase in elk use as the distance from roads increased. Therefore, a method using a distance banding approach, as described by Rowland et al. (2005) is utilized here as an alternate indicator of road effects on elk habitat in the Sheep Creek project area (Table 6). Road closures are consistent across Alternatives 2 and 3 and will have a positive, though small, effect on elk security with only 3.3 miles of roads closing. A minimal amount of security habitat exists in the Sheep Creek project area – 8.3% existing and a proposed 9.3% in both Alternatives 2 and 3.

Table 6. Distance of habitat from open roads within the subwatersheds that comprise Sheep Creek Project unit. Moderate and high security habitat are preferred for elk management. No difference in road management between Proposed Alternatives 2 and 3 resulted in identical distance band analysis results.

Distance Bands by Subwatershed				
Sheep Creek:	**Existing Condition**		**Alternatives 2 and 3**	
Distance (miles)	**Acres**	**% of Total Area**	**Acres**	**% of Total Area**
0.5 mi (low security)	17654	93.0	17647	93.0
1 mi (moderate security)	1300	6.9	1307	6.9
1.5 mi (high security)	23	0.1	23	0.1
Chicken Creek:	**Existing Condition**		**Alternatives 2 and 3**	
Distance (miles)	**Acres**	**% of Total Area**	**Acres**	**% of Total Area**
0.5 mi (low security)	9829	89.6	9517	86.7
1 mi (moderate security)	1146	10.4	1457	13.3
1.5 mi (high security)	0	0.0	0	0.0
Combined (Entire Project Area):	**Existing Condition**		**Alternatives 2 and 3**	
Distance (miles)	**Acres**	**% of Total Area**	**Acres**	**% of Total Area**
0.5 mi (low security)	27484	91.8	27165	90.7
1 mi (moderate security)	2446	8.2	2765	9.2
1.5 mi (high security)	23	0.1	23	0.1

Habitat Effectiveness Index Results

Results from the HEI analysis are nearly identical to the Existing Condition (Table 7). Total HEI was 0.6 for all scenarios. HEI results for Alternatives 2 and 3 are identical due to no difference in road closures and similar size and spacing of units despite differences in areas treated. Although Alternative 3 has fewer acres treated for thinning, proportionally more stands will be transitioned to Forage (canopy <40%) than in Alternative 2. With 3.3 miles of road closure in both alternatives, we observed very small gains in secure habitat with almost no effect on Total HEI.

Table 7. Habitat-effectiveness index calculations for elk habitat under Alternatives 2 and 3 within the Sheep Creek analysis area[1]

Habitat Effectiveness Variable	Habitat Effectiveness Value (Optimal = 1.0)	Comments
HE Cover	0.57	Amount of satisfactory cover relative to marginal cover
HE Size and Spacing	0.67	Mosaic of cover and forage, 54.6:45.4 Alt 2, 52.1:47.9 Alt 3
HE r value using road density	0.47	Open road density 2.06 mi/mi sq LRMP MA-1 ≤ 2.5 mi/mi sq

HE r value using distance bands	0.36	Concentric bands around open roads
Total HEI using road density[1]	0.60	LRMP MA-1 $\geq$ 0.5 HEI
Total HEI using distance band analysis*	0.52	LRMP MA-1 $\geq$ 0.5 HEI
Percent of area $\geq$ 0.5 mi from open motorized route	0.09	Security habitat

[1] HEI calculations do not include a forage variable because current, reliable forage data are not available

Cumulative Effects

Effects of past human activities and naturally occurring events on Wallowa-Whitman lands have been incorporated into the existing conditions for elk habitat in the project area. Direct and indirect effects of each alternative and foreseeable consequences are discussed in the preceding section. Alternatives 2 and 3 are combined in this discussion due to similarities in HEI results. Other management activities that may occur within the Sheep Creek project area include: the Wallowa-Whitman Travel Management Plan, the Wallowa-Whitman Invasive Species Management Plan, and the Blue Mountains Forest Plan Revision.

Ongoing activities including firewood cutting, grazing, prescribed fire, noxious weed control, Idaho Power R.O.W. maintenance, road maintenance, and both motorized and non-motorized recreation will have no measurable impact on cumulative effects for elk. There is currently a Travel Management Area (TMA) that closes roads seasonally (Oct 25- Nov 15) in the Trail Creek area, adjacent to the Sheep Creek Project area, which benefits elk with an increase in secure habitat during hunting season.

Conclusion

All action alternatives are consistent with LRMP standards and guidelines pertaining to elk. Treatments proposed under action alternatives are expected to maintain or slightly improve elk habitat effectiveness, as indicated by HEI values, mostly due to an increase in forage and security availability. Secure habitat is minimal within this study area, with potential for large amounts of secure habitat in the adjacent North Fork John Day Wilderness and seasonally in the Trail Creek area. Proposed road closures across all alternatives will increase security habitat within the project area and will have a small, but positive effect on distribution and escapement.

Old Growth Habitat: American Marten, Northern Goshawk, and Pileated Woodpecker

Introduction

Multi-scale understanding of ecosystems is fundamental to management (Hobbs 2003). The choice of spatial scale must be based on the species' relationship with the landscape and should consider the scale at which to apply our results for management purposes. Wildlife habitat is commonly analyzed at the watershed scale because it provides a systematic way to understand and organize ecosystem information and thus enhances the ability to estimate direct, indirect, and cumulative effects of management activities (Regional Interagency Executive Committee 1995). However, the watershed scale may be too fine to analyze viability for wide-ranging species' unless it can be placed within the broader context of how the watershed contributes to overall species viability (Regional Interagency Executive Committee 1995).

The American marten, Northern Goshawk, and Pileated Woodpecker are MIS of old growth habitat (U.S. Forest Service 1990). Impacts within the Sheep Creek project area are determined by analyzing effects to their habitat at several spatial scales starting with the project level then framing that within the context of the watershed and the Wallowa-Whitman National Forest. These scales take into account the species' relationship with the landscape as well as being practical for management purposes. MIS population viability assessments have been conducted for American marten, Pileated Woodpecker, and Northern Goshawk at the Blue Mountains and Wallowa-Whitman. These assessments are incorporated by reference within the existing condition and effects analysis for each species. For more in-depth information on the methodology behind these assessments, please refer to the full-length assessments in the project record and the associated peer-reviewed literature scales (Penninger and Keown 2011a, Penninger and Keown 2011b, Penninger and Keown 2011c).

The following describes the existing conditions and effects of the Sheep Creek project on three old growth management indicator species:

Section I – American Marten
Section II – Northern Goshawk
Section III – Pileated Woodpecker

I. Pacific Marten (*Martes caurina*)

Background

Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the American Marten Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011a). Portions of that assessment are summarized below.

The Pacific marten (*Martes caurina,* - hereafter marten*)* is associated with mature, mesic coniferous forests and is one of the most habitat-specialized mammals in North America (Bull and Heater 2001). Marten require complex physical structure in the forest understory created by lower branches of trees, shrubs and coarse woody debris (Buskirk and Ruggiero 1994, Bull and Heater 2000). Research found marten in northeastern Oregon using large-diameter hollow trees and logs, accumulations of coarse woody debris, and trees with brooms for denning and resting sites (Bull and Heater 2000). 70% of martens in eastside mixed conifer forests used snags > 23.9" dbh for denning and resting and downed wood > 20.7" dbh for denning, resting and foraging (Mellen-Mclean et al. 2017).

Broad-Scale Habitat Assessments

Wales (2011) used Bayesian Belief Network (BBN) Models to conduct viability assessments for various wildlife species of interest at the Blue Mountains and Wallowa-Whitman scales, including American marten. Using a threshold of 60% canopy closure and large tree structure of 20" in Cold Moist and Cold Dry Potential Vegetation Groups, Wales compared current habitat conditions to those estimated to have occurred historically. The threshold of >40% of the historical amount of source habitat in a watershed was used to identify watersheds with a relatively high amount of source habitat that would contribute to species viability. Watersheds that contain > 40% of the estimated historical median amount of source habitat (1,136 acres) are believed to provide for habitat distribution and connectivity, and better contribute to species viability across the Forest.

Historically, marten habitat was broadly distributed and of high abundance, and marten were well distributed within the mixed conifer forests of the Blue Mountains. The abundance and distribution of habitat likely provided for a high degree of connectivity within the elevations and forest cover types that provided source habitat for martens. Currently, marten habitat is more abundant in some parts of the Blue Mountains and less abundant in others, but less contiguous than historically. Currently marten habitat is broadly distributed and of high abundance, but there are gaps where suitable environments are absent or only present in low abundance.

Table 8. Historical and current marten habitat identified by Wales (2011)

	Historical Habitat (acres)	Current Habitat (acres)	Percentage of Historical Habitat
Regional Scale (Blue Mountains)	277,715	257,942	93%
Wallowa-Whitman NF scale	144,347	129,943	90%

Like most coarse scale vegetation data sets, the one used in the viability assessment is imperfect. However, it indicates landscape patterns that reasonably estimate habitat conditions for marten at larger scales.

Existing Conditions

Upper Grande Ronde

The Sheep Creek project area lies within the Upper Grande Ronde watershed, composed of the Sheep Creek and Chicken Creek subwatersheds. This watershed contains 3,698 existing acres of marten source habitat (habitat that can support a stable or increasing population of marten) out of 70,857 (5%) potential acres of marten habitat. This watershed shows the impacts of past management activities which resulted in reduction of marten habitat. The current watershed index is 0.74 with the historic watershed index at 2.78, indicating a high historic level of habitat quality and a current low level of habitat quality and quantity. This watershed currently does not provide $\geq$ 40% of the median amount of source habitat that occurred historically. (Penninger and Keowen 2011a). The weighted index of this watershed is 1111, which indicates this watershed does not have the capability of supporting self-sustaining and well-distributed marten populations.

Sheep Creek Project Area

Primary source habitat for marten is defined as habitat within moist and cold upland forests in the LOS stage with ≥ 60% canopy closure and ≥ 20" dbh as the tree size. According to a GIS query, the Sheep Creek project area contains 2,712 acres of source habitat, which comprises 9% of the project area. Remote sensing cameras were utilized in the summer of 2017 and 2018 in areas identified as marten habitat. Marten were detected on the southern boundaries of the project area, in the same areas that collared marten were detected in a 1995 research study (Bull et al. 2005b). Source habitat conditions are primarily distributed on north facing slopes along the Sheep and Chicken creek main tributaries with areas of important connectivity to the Upper North Fork John Day River along the southern boundary of the project area. Modeled source habitat, remote cameras and past research were all taken into account in our analysis.

Pacific marten habitat was designed into the Sheep Creek project area to maximize the retention of high canopy cover habitat on north facing slopes and within identified areas of important connectivity. In specific areas proposed silviculture treatments were dropped or modified to retain higher canopy cover, and fuels treatments along Rd 5184 will retain greater ground heterogeneity in spots to maintain travel areas between watersheds.

Direct/Indirect Effects

ALTERNATIVE 1

There will be no direct adverse effects to marten from the Alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. Existing marten source and secondary habitat would remain unchanged. The project area would continue to increase in risk to uncharacteristic insect outbreaks and fire that has the potential to degrade connectivity for marten between watersheds, in light of the already reduced habitat conditions.

ALTERNATIVES 2 AND 3

In general, commercial treatments have the potential to affect marten habitat suitability by reducing stand canopy closures and understory tree densities and simplifying the structural complexity. This could expose marten to higher predation risk, reduce foraging opportunities and potential denning habitat. Habitat after a commercial treatment would not be expected to function as source habitat and potentially not as foraging habitat in the medium term (0-50 years) before canopy cover increases and heterogeneous structure returns. Commercial treatments proposed under alternative 2 and 3 would treat 388 acres and 33 acres (14% and 1.2% of existing) source habitat found within the project area (Table 5).

Application of fuel treatments outside of stands proposed for timber harvest has the potential to reduce understory and down wood densities, but is unlikely to substantially reduce stand canopy closures. Moriarty (2014) compared marten movement within open, simple stands resulting from fuels treatments and untreated complex stands. She found that marten selected home ranges with a disproportionate amount of complex stands and avoided openings. Simple stands were marginally avoided compared to complex stands. Marten movement within simple stands vs. complex stands suggests that marten use simple stands for travel and for intermittent foraging but not for denning. Therefore, fuels treatments are expected to degrade, but not remove, marten habitat. Alternatives 2, and 3 propose fuels treatments on 436 and 268 acres (16% and 9% respectively (Table 9).

Table 9. Proposed Silvicultural and Fuels Treatments in Marten Source Habitat within Sheep Creek Project Area

	Alternative 2		Alternative 3	
	Commercial Harvest	Prescribed Fire Only	Commercial Harvest	Prescribed Fire Only
Acres of Treatment within Source Habitat	388 acres	436 acres	33 acres	268 acres
Percent of Existing Source Habitat	14%	16%	1%	9%

Marten Habitat at the Sheep Creek Watershed Level

Post-treatment availability of source habitats would continue to be below the threshold of 40% of the historical amount in the Upper Grande Ronde watershed under all action alternatives. Post-treatment amounts of source habitat as a percentage of potential habitat would continue to be below the historic median of 16% described by Penninger and Keown (2011a). However, the majority of proposed commercial treatment within *potential* marten habitat is intended to encourage large tree structure in the long term. No existing large trees (a vital component of marten source habitat) will be removed as part of this project. Marten connectivity has been emphasized within this project and fuels treatments are intended to create conditions where fire can return to the landscape. Allowing natural processes to shape future structure stage in the long term, while being mindful of connectivity concerns over the short term will ensure marten can continue to use the area.

Marten Habitat at the Wallowa-Whitman Scale

Estimated habitat impacts at the project area and watershed scales (described above) are based on source habitat parameters modeled according to Penninger and Keown (i.e. 50% canopy closure and 15" dbh criteria). Existing marten source habitat on the Wallowa-Whitman as modeled by Wales (2011) totals 129,943 acres. As a result of proposed activities under the Sheep Creek project, source habitats would be impacted at a maximum of 824 acres under Alternatives 2. Because source and secondary habitats at the Forest level were modeled according to more conservative thresholds described by Wales (i.e. 60% canopy closure and 20 inch dbh criteria), it is reasonable to assume that the source habitat impacts would actually be less than the estimate based on the 50% canopy closure and 15" dbh criteria. Therefore, reduction of habitat quantity and quality at the Forest level would equate to less than 0.006% of existing source habitat across alternatives.

Cluster analysis used to describe existing distribution of source habitats across the Wallowa-Whitman indicates that these habitats are well distributed across the Forest (Penninger and Keown 2011a). Post-treatment levels of source habitat under all Sheep Creek action alternatives are expected to result in no change in the number of watersheds in Cluster W3 containing >40% source habitat that contribute to marten habitat distribution.

<u>Landscape Permeability</u>
Treatments proposed under each action alternative may decrease existing habitat permeability due to reduced canopy closure, decreased structural complexity, and increased disturbance on specified and temporary roads. However, areas of connectivity between the subwatersheds of the Upper Grande Ronde and the Upper North Fork John Day River were identified and designed into the project. Commercial and fuels treatments in these areas will maintain the stand at the upper third of the site potential and higher levels of downed woody material.

Cumulative Effects

Past, present, and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands have been incorporated into the existing conditions for amounts and locations of marten habitats in the analysis areas and into the viability analysis.

Ongoing and future livestock grazing is expected to have no effect on marten habitat because cattle tend to avoid areas with high amounts of down wood. On Forest Service lands within and outside the project area, firewood cutting will continue to reduce available snags and logs, but the effect is limited to areas adjacent to open roads.

Wales et al. (2011) estimated that approximately 144,300 acres of source habitat existed on the Wallowa-Whitman historically. At the time of the analysis, approximately 129,900 acres (90% of estimated historical conditions) of source habitat occurred on the Wallowa-Whitman. Since the viability assessment was run 17 Vegetation/Fuels Restoration projects have been analyzed across the Wallowa-Whitman. Some have been implemented and some are still undergoing the NEPA process, but are anticipated being implemented in the foreseeable future. These combined projects, including the Sheep Creek Vegetation Management project, anticipate commercially impacting 3,123 acres of marten source habitat and non-commercially impacting 5,478 acres of marten source habitat. Taking these 8,601 acres of impacted source habitat into account, this results in approximately 122,521 acres (84% of estimated historical conditions) of source habitat existing on the Wallowa-Whitman. Cumulatively, vegetation management activities on the Wallowa-Whitman are not expected to change the viability outcome found by Wales et al. and marten source habitat will remain well distributed and highly abundant with some gaps where suitable environments are absent or only present in low abundance (viability outcome B).

Conclusion

Because this project impacts less than 0.006% of source habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative effect to marten habitat. The decrease in habitat quality due to the Sheep Creek Vegetation Management Project will be insignificant at the scale of the Wallowa-Whitman. The Upper Grande Ronde watershed will remain below the threshold of 40% of the historical amount and this project will not change the watersheds contribution to species viability on the Wallowa-Whitman. No existing large trees (a vital component of marten source habitat) will be removed as part of this project. Marten connectivity between watersheds has been emphasized within this project and fuels treatments are intended to create resilient landscapes in the face of disturbances (insects, fire, disease) and environmental stressors (global climate change, human impact). Allowing natural processes to shape future structure stage in the long term, while being mindful of connectivity concerns over the short term will ensure marten can continue to thrive.

II. Northern Goshawk

Background

Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the Northern Goshawk (*Accipiter gentilis*) Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011b). Portions of that assessment are summarized below.

The Northern Goshawk (*Accipiter gentilis*, hereafter goshawk) was chosen as a supporting indicator of abundance and distribution of mature and old-growth forests (LRMP 1990). The goshawk is associated with dense canopied mixed conifer, white fir, and lodgepole pine associations (Wisdom et al. 2000). Important habitat attributes of goshawk prey species include snags, down logs, woody debris, large trees, openings, herbaceous and shrubby understories, and an intermixture of various forest structural stages (Wisdom et al. 2000). Goshawks are prey generalists and use open understories below the forest canopy and along small forest opening to forage for mammals and small birds (Bull and Hohman 1994, Marshall 1992).

Goshawks use broad landscapes that incorporate multiple spatial scales to meet their life requisites (Squires and Kennedy 2006). At least three levels of habitat scale are recognized during the breeding season: (1) a nest area, composed of one or more forest stands or alternate nests; (2) a post fledging area (PFA), which is an area around the nest used by adults and young from the time of fledging, when the young are still dependent on the adults for food, to independence; (3) a foraging area that comprises the breeding pairs entire home range (Reynolds et al. 1992, Reynolds 1983).

The nest area, or nest site, is the area immediately surrounding the nest tree, including the forest stand containing the nest tree. In general, goshawk nest areas are unique in structure, associated with drainage bottoms, large trees, dense basal area, multiple canopies, and high canopy closure (>50%) primarily within mature and older forests with high amounts of down wood and snags (McGrath et al. 2003).

The post fledging area (PFA) surrounds the nest area and is defined as the area used by the family group from the time the young fledge until they are no longer dependent on the adults for food, up to two months (Reynolds et al. 1992, Kennedy et al. 1994). PFAs generally have patches of dense trees, developed herbaceous and/or shrubby understories and habitat attributes (snags, down logs, small openings) that are critical for goshawk prey (Reynolds et al. 1992). The PFA is potentially important to the persistence of goshawk populations, as it may correspond to the area defended by the breeding pair and provides fledgling hiding cover and foraging opportunities as fledglings learn to hunt.

Foraging areas average 3,707-5,189 acres in size in eastern Oregon (Daw and DeStefano 2001). Goshawks can be considered habitat generalists at the large scale with a wide variety of prey species and associated habitat requirements (Squires and Kennedy 2006, Reynolds et al. 2007). Canopy cover >50%, dense basal area, and wet openings are critical near nest sites and decrease in importance as distance from nest site increases (Daw and DeStefano 2001). Common factors that influence prey distribution and abundance include snags, large downed logs, large trees, and canopy openings (Reynolds et al. 1992).

Viability Determination

Throughout the Interior Columbia Bain, the amount of source habitat (i.e., habitat requirements to provide long term population persistence) available to the goshawk has declined from historical conditions. The greatest declines have occurred in the interior ponderosa pine and western larch forest types. It is estimated that there has been a 96% decline in old forest single-story ponderosa pine (Wisdom et al. 2000). However, Douglas-fir, grand fir, white fir, lodgepole pine, and juniper sagebrush have all increased in abundance from historical conditions. The overall decline in source habitat and strong decline in the ponderosa pine cover type is offset somewhat by increases in these other cover types and structural stages that provide source habitat.

Additional source habitat analysis was conducted at a finer scale on National Forest lands as part of a species viability assessment conducted in support of the Blue Mountains Forest Plan revision (Penninger and Keown 2011b). The current viability outcome index for the Wallowa-Whitman show that current source habitat for the goshawk is slightly lower than for the entire Blue Mountains but is very near historical conditions, indicating that suitable habitats are broadly distributed and of high abundance, and the goshawk is likely well-distributed throughout the Wallowa-Whitman (Penninger and Keown 2011b).

LRMP Standards and guidelines

The Regional Forester's Eastside Forest Plan Amendment #2 (SCREENS) requires that all known and historically used goshawk nest-sites be protected from disturbance. An active nest is defined as a nest that has been used by goshawks within the past five years. SCREENS requires that a 30-acre buffer of the most suitable nesting habitat be established around every known active and historical nest tree(s), that it be deferred from harvest, and that a 400-acre post fledging area be established around every known active nest site. While harvest activities can occur within the PFA, up to 60% of the area should be retained in LOS conditions and harvest is to promote the development of LOS. Management of the PFA is intended to provide a diversity of forest conditions. Thinning from below with irregular spacing of leave trees would maintain the appropriate stand composition and structure. A seasonal restriction on logging in the PFA would be implemented during the nesting season from March 1 – September 30.

Existing Conditions

Upper Grande Ronde

The Sheep Creek project area lies within the Upper Grande Ronde watershed. This watershed contains 12,870 existing acres of goshawk source habitat (habitat that can support a stable or increasing population of goshawk) out of 105,916 (12%) potential acres of goshawk habitat. The current watershed index is 2.30 with the historic watershed index at 2.94, indicating a shift from high historic levels of habitat quality to a current moderate level of habitat quality and quantity. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically and is above the threshold necessary to support goshawk population viability (Penninger and Keowen 2011b). The weighted index of this watershed is 29,259, indicating that this watershed provides habitat of the quality, quantity, and distribution to support a self-sustaining and well-distributed goshawk population.

Sheep Creek Project Area

Northern Goshawk source habitat was assessed for the Sheep Creek analysis area using four variables; potential vegetation group, canopy closure, number of canopy layers and tree size, as defined in the Northern Goshawk Management Indicator Species Assessment (Peninger and Keown 2011). Potential vegetation groups include dry ponderosa pine, dry Douglas-fir, dry grand fir, cool moist and cold dry. Canopy closure is generally greater than 40% in the dry vegetation types and greater than 60% in the cool and cold types. Canopy layers included both single and multi-story and tree size is defined as 15" dbh or greater. A GIS query found 2,387 acres of primary Northern Goshawk habitat (8% of the project area). Audio callback transects were conducted June-August 2017-2018 along transects in identified goshawk source habitat and high intensity surveys were done around historic nest sites. Two active goshawk nests were located within the project area. In accordance with the East Side Screens, a 30 acre no touch buffers were established around each nest and a 400 acre post-fledging area (PFA) was established. Fuels treatments will occur within 50% of one PFA but will occur outside the timing restrictions of March 1st- August 31st. If any other nests are discovered during implementation, the same buffers and restrictions will apply.

Direct and Indirect Effects

ALTERNATIVE 1

There will be no direct adverse effects to old-growth associated MIS from the No Action Alternative because no timber harvest, fuels treatments, or transportation activities will occur. Existing source habitat would remain unchanged. However, the no-action alternative maintains possible unsustainable conditions in late-seral stage montane forests where there have been large transitions from shade-intolerant to shade-tolerant tree species, described as a management issue for Group 6 habitats by Wisdom et al. (2000).

ALTERNATIVES 2 AND 3

<u>Sheep Creek project area</u>
Both timber harvest and fuels treatments within and outside timber harvest units would occur in Northern Goshawk source habitat under all action alternatives. Intermediate harvest treatments are expected to increase average stand diameter due to removal of trees primarily in smaller size classes, but across all size classes for Alternatives 2 and 3. Due to the possibility of snag removal during harvest and potential consumption of down logs during post-treatment underburning, treatments that retain sufficient canopy closures are still expected to degrade, but not remove, source habitat. Although some habitat elements may be reduced where habitat is degraded, sustainability of habitats is expected to increase as stand density reductions lower the risk of disturbance such as stand-replacement fire, especially in Dry Forest types. Table 10 shows acres and percent of source habitat proposed for treatment under each alternative.

Treatments proposed under Alternative 2 would impact the greatest amount of goshawk source habitat. Harvest activities would occur within 699 acres in Alternative 2 and 503 acres in Alternative 3. These harvest activities could alter 21-29% of goshawk source habitat within the Sheep Creek project area for approximately 20-30 years until canopy closure recovers and snags and logs are recruited. Although the treated acres may no longer meet the definition of source habitat, they would still be available for goshawk foraging, roosting, and travel between other habitat patches. Fuel management activities (pre-commercial thinning, hand piling and prescribed fire would occur within 139 acres in Alternative 2 and 273 acres in Alternative 3. Fuel management could reduce structural complexity in the understory in up to 11% of goshawk source habitat in the project area, but it will still meet the requirements for source habitat.

Table 10. Summary of Proposed Treatments in Goshawk Source Habitat in the Sheep Creek Project Area

	Treatment Type by Alternative in Acres (% of Source Habitat)			
	Alternative 2		Alternative 3	
Existing Source Habitat	Commercial	Non-commercial	Commercial	Non-commercial
2,387 acres	177 acres (7%)	302 acres (12%)	0 acres (0%)	190 acres (8%)

In addition to impacts to available habitats, each action alternative poses potential for direct impact to nesting individuals. Both timber harvest and prescribed fire could cause individual harm or mortality if operations destroy a nest tree occupied by young of the year. If goshawk nesting is discovered prior to, or during implementation, a no-activity nest area of at least 30 acres will be designated for active nests. Because goshawks were detected at locations during 2016 and 2017 surveys, and because the existing nest site was not confirmed with 100% certainty, additional goshawk surveys in these locations would occur prior to implementation of proposed silvicultural and fuels treatments.

Goshawk Habitat at the Watershed Level

Watershed indices reported by Wales (2011) and further assessed by Penninger and Keown (2011b) for the existing condition showed that the Upper Grande Ronde watershed currently contains a high amount of source habitat. Treatments proposed under Alternative 2 would reduce the amount of source habitat available in the watershed by approximately 1 percent and by 0 percent under Alternative 3. Post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the Upper Grande Ronde watershed under all action alternatives, thereby continuing to contribute to species viability at the watershed scale.

Goshawk Habitat at the Wallowa-Whitman Scale

Existing goshawk source habitat on the Wallowa-Whitman as modeled by Wales et al. 2011 totals 440,696 acres. As a result of projected habitat loss under the Sheep Creek project, source habitats at the Forest-level would decline by less than 1 percent under all action alternatives.

Cluster analysis used to describe existing distribution of source habitats across the Wallowa-Whitman indicates that these habitats are well distributed across the Forest. Post-treatment levels of source habitat under all Sheep Creek action alternatives result in no change in the number of watersheds in Cluster W3 containing >40% source habitat that contribute to goshawk habitat distribution.

Cumulative Effects

Cumulative effects for goshawk are analyzed for the Upper Grande Ronde watershed. Past, present and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands are incorporated into the existing conditions for amounts and locations of marten habitats in the analysis areas. Although some commercial treatments may occur within goshawk suitable habitat, the scale of potential impacts is not substantial in comparison to source habitats currently estimated to exceed 27,000 acres.

Ongoing and future livestock grazing is expected to have a minimal effect on suitable habitats. Additional grazing may occur in treated stands within the project area, but is not expected to alter suitable characteristics. On Forest Service lands within and outside the project area, firewood cutting will continue to reduce available snags and logs, but the effect is limited to areas adjacent to open roads. Access within the watershed and across the Wallowa-Whitman may change pending the outcome of the Forest Travel Management Plan. Timber harvest on private inholdings is expected to continue at some level, with anticipated reductions of trees larger than 10" dbh. Lands to the south of the project area will continue to consist of open grassland habitats in private ownership.

Wales et al. (2011) estimated that approximately 466,679 acres of source habitat existed on the Wallowa-Whitman historically. At the time of the analysis, approximately 440,696 acres (94% of estimated historical conditions) of source habitat occurred on the Wallowa-Whitman. Since the viability assessment was run 17 Vegetation/Fuels Restoration projects have been analyzed across the Wallowa-Whitman. Some have been implemented and some are still undergoing the NEPA process but are anticipated being implemented in the foreseeable future. These combined projects, including the Sheep Creek Vegetation Management project, anticipate commercially impacting 7,222 acres of goshawk source habitat and non-commercially impacting 19,151 acres of goshawk source habitat. Taking these 26,373 acres of impacted source habitat into account there is approximately 440,306 acres (94% of estimated historical conditions) of source habitat existing on the Wallowa-Whitman. Cumulatively, vegetation management activities on the Wallowa-Whitman are not expected to change the viability outcome found by Wales et al. and goshawk source habitat will remain well distributed and highly abundant (viability outcome A).

Conclusion

Because this project impacts less than 1% of source habitat across the Forest, the overall direct, indirect and cumulative effects will result in a minimal negative effect to goshawk habitat. The loss of habitat will be insignificant at the scale of the Wallowa-Whitman. Post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the Upper Grande Ronde watershed under all action alternatives, thereby continuing to contribute to habitat distribution and species viability on the Wallowa-Whitman.

III. Pileated Woodpecker

Background

Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the Pileated Woodpecker (*Drycopus pileatus*) Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011c). Portions of that assessment are summarized below.

Pileated Woodpeckers feed primarily on ants (Beckwith and Bull 1985) in dead wood in snags, logs, and naturally created stumps (Bull et al. 1986). Based on research data compiled in the DecAID Wood Advisor (Mellen-Mclean et al. 2017) for eastside mixed conifer forests, 70% of Pileated Woodpeckers in the populations studied used snags > 12.9 in. dbh for foraging. Stands with high density of snags and logs were preferred for foraging (Bull and Melsow 1977).

In northeast Oregon, the Pileated Woodpecker shows high selection for mature, unlogged grand fir stands with ≥60% canopy closure, multiple canopy layers, and high snag density (Bull 1987, Bull and Holthausen 1993). Bull et al. (2007) found that densities of nesting pairs of Pileated Woodpeckers were positively associated with the amount of late structural stage forest and negatively associated with the amount of area dominated by ponderosa pine and the amount of area with regeneration harvest. Although there is a preference for dense canopy stands, high tree mortality and loss of canopy closure in stands of grand fir and Douglas-fir did not appear to be detrimental to Pileated Woodpecker provided that large dead or live trees and logs were abundant and that stands were not subject to extensive harvest. Pileated Woodpecker densities remained steady over 30 years in areas where canopy cover dropped below 60% due to tree mortality; older stands of grand fir and Douglas-fir consisting primarily of snags continued to function as nesting, roosting and foraging habitat for Pileated Woodpeckers. While closed canopy forests were not essential for use by Pileated Woodpeckers, nest success was higher in home ranges that had greater amounts of forested habitat with ≥60% canopy closure (Bull et al. 2007).

Viability Determination

Habitat trends of the Pileated Woodpecker were assessed at the Interior Columbia Basin, Blue Mountains ecological reporting unit (ERU), and Wallowa-Whitman scales using information provided by Wisdom et al. (2000) and the species viability assessment conducted by Wales (2011) in support of the Blue Mountains Forest Plan revision.

A fine-scale analysis of source habitat on National Forest lands in the Blue Mountains, including the Wallowa-Whitman was conducted in 2011 (Penninger and Keown 2011c).This analysis indicated that there has been a decline in the amount of source habitat on the Wallowa-Whitman from historical conditions. However, source habitat of the Pileated Woodpecker is still available in adequate amounts and distribution to maintain pileated species viability on the Wallowa-Whitman. Currently, there are approximately 206,374 acres (57% of historical condition) of source habitat on the Wallowa-Whitman, with twenty-nine of the thirty-five watersheds (83%) on the Wallowa-Whitman that historically provided source habitat, continuing to provide that habitat. Reductions of snags and the presence of roads has decreased the quality of source habitat in many watersheds but 33% of the watersheds on the Wallowa-Whitman have high watershed index scores, indicating good habitat abundance, moderate to high snag densities and low to moderate road densities. Additionally, 29% of the watersheds are in the moderate category. Watersheds having ≥ 40% of the median amount of source habitat are distributed across the Wallowa-Whitman and found in all clusters.

The viability assessment indicates the Wallowa-Whitman still provides for the viability of the Pileated Woodpecker. The Pileated Woodpecker is distributed across the Wallowa-Whitman and there are adequate amounts, quality, and distribution of habitat to provide for Pileated Woodpecker population viability.

Existing Condition

Upper Grande Ronde

The Sheep Creek project area lies within the Upper Grande Ronde watershed. This watershed contains 5,776 existing acres of pileated source habitat (habitat that can support a stable or increasing population of Pileated Woodpeckers) out of 103,621 (6%) potential acres of Pileated Woodpecker habitat. The current watershed index is 0.79 with the historic watershed index at 2.63, indicating a high historic level of habitat quality and a current low level of habitat quality and quantity. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically, and is above the threshold necessary to support Pileated Woodpecker population viability (Penninger and Keowen 2011c). The weighted index of this watershed is 17,033, which, when compared to other watershed indices, indicates this watershed provides habitat of the quality, quantity, and distribution to support a self-sustaining and well-distributed Pileated Woodpecker population.

Sheep Creek Project Area

Although Pileated Woodpeckers will use many habitat types, successful reproduction is tied to source habitat, which is typically Old Forest Multi Structure (OFMS). Pileated Woodpecker source habitat was assessed for the Sheep Creek analysis area using four variables; potential vegetation group, canopy closure, number of canopy layers and tree size, as defined by Penninger and Keown (2011c). Potential vegetation groups include dry Douglas fir, dry grand fir, cool moist and cold dry. Canopy closure is generally greater than 40% in the dry vegetation types and greater than 60% in the cool and cold types. Canopy layers included both single and multi-story and tree size is defined as 20" dbh or greater. Source habitat for Pileated Woodpeckers within the Sheep Creek analysis area is approximately 1,604 acres, (5%) of the project area. Surveys during the 2018 field season consistently found pileated sign in dry and moist OFMS stands.

LRMP standards and guidelines

The LRMP requires that a 300-acre pileated feeding area be established in proximity to any patch of MA15 ≥ 300 acres and that at least 2 snags > 10" dbh/acre be maintained within the feeding area. The Regional Forester's Eastside Forest Plan Amendment #2 (SCREENS) requires the maintenance of snags and GTR trees >21" dbh at 100% potential population levels; at least 2.25 snags/acre are needed after post-sale activities are completed to meet the 100% level. The SCREENS require a higher density of snags compared to the LRMP and, therefore, designation of a 300-acre pileated feeding area as identified in the LRMP is exceeded by SCREENS directions. Within the Sheep Creek Project area, there is one stand of trees designated MA15 that is >300 acres.

Direct and Indirect Effects

ALTERNATIVE 1

There will be no direct adverse effects to Pileated Woodpeckers from alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. Existing source habitat for Pileated Woodpeckers would remain unchanged. The no-action alternative maintains potentially unsustainable conditions in warm, dry LOS forests where there have been large transitions from shade-intolerant to shade-tolerant species. In the near-term, these denser forests with greater structural complexity may be highly attractive to Pileated Woodpeckers. However, large uncharacteristic wildfires could render this habitat unsuitable.

ALTERNATIVES 2 AND 3

Both timber harvest and prescribed fire treatments within and outside timber harvest units would occur in Pileated Woodpecker source habitat under all action alternatives. Thinning harvest treatments are expected to increase average stand diameter due to removal of trees primarily in smaller size classes, but across all size classes for Alternatives 2 and 3. Treatments that retain canopy closures that meet the definition of source habitat would remain as source habitat. However, due to the possibility of minor snag reductions for logging safety, and potential consumption of downed logs and snags during post-treatment prescribed fire units, treatments that retain sufficient canopy closures are expected to degrade, but still function as source habitat. Although some habitat elements could be reduced, sustainability of habitats is expected to increase as stand density reductions lower the risk of disturbance such as stand-replacement fire, especially in warm, dry forest types. Table 11 shows acres and percent of source habitat proposed for treatment under each alternative.

Table 11. Summary of Proposed Treatments in Pileated Source Habitat in the Sheep Creek Project Area

	Treatment Type by Alternative in Acres (% of Source Habitat)			
	Alternative 2		Alternative 3	
Existing Source Habitat	Commercial	Non-commercial	Commercial	Non-commercial
1,604 acres	177 acres (11%)	289 acres (18%)	3 acres (0.001%)	177 acres (11%)

Treatments proposed under Alternative 2 would affect the largest amount of pileated source habitat. Harvest activities may alter 11-18% of pileated source habitat within the Sheep Creek project area for approximately 20 years until canopy closure recovers and snags and logs begin to be recruited. Fuels activity could reduce structural complexity in the understory of pileated source habitat, but it will still meet the requirements for source habitat as long as down wood standards continue to be met.

Retention of all snags except for safety concerns minimizes the potential for direct impacts to nesting Pileated Woodpeckers. In the long-term, accelerated tree growth due to lower stocking densities is expected to develop large trees, and consequently large snags, at a faster rate than untreated areas. While long-term availability of total snag numbers may decrease, available snags will on average be larger in treatment units compared to untreated areas (See snag analysis).

Activities that increase overall human presence and project-related noise levels, including system road reconstruction as well as timber harvest, may temporarily displace Pileated Woodpeckers locally in the short-term (i.e. during implementation), but are not expected to impact distribution or productivity within the project area in the long-term.

Pileated Woodpecker Habitat at the Watershed Level

Watershed indices reported by Wales (2011) and further assessed by Penninger and Keown (2011c) for the existing condition showed that the Upper Grande Ronde watershed low amount of source habitat compared to historical conditions. Treatments proposed under Alternative 2 and 3 would reduce the amount of source habitat available in the watershed by 3% and 0.05%, respectively.

Post-treatment availability of source habitats would continue to exceed threshold of 40% of the historical amount in the Upper Grande Ronde watershed under all action alternatives, thereby continuing to contribute to species viability at the watershed scale.

Pileated Woodpecker Habitat at the Wallowa-Whitman Scale

Existing Pileated Woodpecker source habitat on the Wallowa-Whitman as modeled by Wales (2011) totals 129,943 acres. As a result of projected habitat loss under the Sheep Creek project, source habitats would be affected by a maximum of 466 acres. This results in a reduction in source habitat of 0.3% at the Forest level.

Cluster analysis used to describe existing distribution of source habitats across the Wallowa-Whitman indicates that these habitats are well distributed across the Forest (Penninger and Keown 2011c). Post-treatment levels of source habitat under both Sheep Creek action alternatives result in no change in the number of watersheds in Cluster W3 containing >40% source habitat that contribute to Pileated Woodpecker habitat distribution.

Cumulative Effects

Past, present and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands have been incorporated into the existing conditions for amounts and locations of source habitats in the analysis area.

Cumulative impacts of ongoing and foreseeable actions within the next 5 years from the present which overlap in time and space with the Sheep Creek project and create a potentially measurable effect were considered. Ongoing and future livestock grazing is expected to have no effect on suitable habitats. Additional grazing may occur in treated stands within the project area, but is not expected to alter source habitats. On Forest Service lands within and outside the project area, firewood cutting will continue to reduce available snags and logs, but the effect is primarily limited to areas adjacent to open roads. Access within the watershed and across the Wallowa-Whitman will change when the Forest Travel Management Plan is implemented. Limiting public motor vehicle use to designated roads, trails and areas has the potential to reduce the miles of open roads where firewood gathering can reduce snags and logs. Timber harvest on private inholdings is expected to continue at some level, with anticipated reductions of trees larger than 10" dbh. Lands to the south of the project area will continue to consist of open grassland habitats in private ownership.

Wales et al. (2011) estimated that approximately 359,608 acres of source habitat existed on the Wallowa-Whitman historically. At the time of the analysis, approximately 206,374 acres (57% of estimated historical conditions) of source habitat occurred on the Wallowa-Whitman. Since the viability assessment was run 15 Vegetation/Fuels Restoration projects have been analyzed across the Wallowa-Whitman. Some have been implemented and some are still undergoing the NEPA process, but are anticipated being implemented in the foreseeable future. These combined projects, including the Sheep

Creek Vegetation Management project, anticipate commercially impacting 3,454 acres of pileated source habitat and non-commercially impacting 10,039 acres of pileated source habitat. Taking these 13,493 acres of impacted source habitat into account, this results in approximately 192,881 acres (53% of estimated historical conditions) of source habitat existing on the Wallowa-Whitman. Cumulatively, vegetation management activities on the Wallowa-Whitman are not expected to change the viability outcome found by Wales et al. and pileated source habitat will remain distributed frequently as patches and in low abundance (Viability outcome C).

Conclusion

Because this project impacts less than 0.3% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative effect to pileated habitat. The reduction of habitat would be immeasurable at the Wallowa-Whitman scale. Post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the Upper Grande Ronde watershed under all action alternatives, thereby continuing to contribute to habitat distribution and species viability on the Wallowa-Whitman.

Connectivity

The SCREENS provides direction for connectivity. Old growth stands are directed to be connected in a least two different directions by the shortest length, minimum 400 ft. wide corridor which maintains canopy cover in the upper one-third of the site potential. If this standard cannot be met, proposed treatments are dropped.

According to the SCREENS Forest Plan Amendment (U.S. Forest Service 1995), connectivity corridors do not necessarily meet the same description of "suitable" habitat for breeding for old growth species, but allows free movement between suitable breeding habitats. Identifying these connective corridors ensures that blocks of habitat maintain a high degree of connectivity between them, and do not become fragmented in the short-term. Connective corridors between patches of old growth structures have been identified on a map that is on file at La Grande Ranger District. These connective corridors are small blocks of land that attempt to provide connectivity between old-growth stands at a small scale.

Existing Conditions

Distribution of OFMS stands and MA15 areas, marten source habitat (due to its identified high canopy cover) slope, aspect and soil type was used to identify watershed level landscape scale corridors and permeability (different from the fine-scale connective corridors between old-growth stands). These areas of connectivity are primarily found in the southeast of the project area. These corridors contain the majority of the old growth and MA15 found within the Sheep Creek project area and occur on north and north-east facing slopes with the assumption that these areas have the greatest potential for productivity and will contain the highest levels if canopy cover and multi-level complexity. These areas were built into the project design to allow the landscape to continue to provide movement corridors for marten between sub-watersheds that have higher levels of marten source habitat.

Direct/Indirect Effects

ALTERNATIVE 1

This alternative would have no direct effect on connectivity between LOS habitat patches. The current level of connectedness would persist and would improve in quality in the absence of large scale disturbances. In the absence of silvicultural treatments that reduce tree stocking, the connective corridors will continue to increase in canopy closure and structural complexity. This condition in cold and moist upland forests can enhance connectivity for species like American marten. Conversely, dry upland forests are inherently less structurally complex than cold and moist upland forests. In the absence of silvicultural treatments to reduce tree stocking, these stands would continue to allow the establishment of shade tolerant grand fir, increased canopy closure, and increased stress to competition for resources. In the long-term (30+ years) these drier stands would be subjected to increased risks from wildfire, insects and diseases that will kill trees in numbers and distribution that could negatively affect connectivity between patches of single strata LOS habitat.

ALTERNATIVES 2 AND 3

Alternative 2 and Alternative 3 would reduce the quality of connectivity corridors on 154 acres and 84 acres respectively by reducing the canopy closure and structural complexity. Silvicultural prescriptions in connective corridor units would reduce competition between residual trees, increase tree growth rates, and increase trees' ability to defend against insects and diseases, while retaining levels of canopy closure and structural complexity to facilitate movement of wildlife between old-growth habitat patches. Fuel treatments will reduce the complexity of the stand but won't affect canopy cover in existing high canopy cover stands. Any treatment taking place in an identified connective corridor will maintain stand in the upper third of its site potential.

Cumulative Effects

The no action alternative will not contribute to the cumulative effects of past, present and foreseeable future activities. Any effects of forgoing silvicultural treatments and prescribed burning would occur later in time, and are addressed as indirect effects above.

Alternative 2 would impact more acres than Alternative 3. It is unknown whether the level of treatments would compromise connectivity to a level that leads to isolation or fragmentation of wildlife habitat. However, the riparian habitat conservation area network, M15 areas, and the remaining forest matrix would combine to facilitate varying degrees of connectivity between distant LOS habitat patches.

Conclusion

The incremental effects of prescribed burning, non-commercial thinning, and mechanical fuels reduction would be immeasurable relative to the quality and function of connective corridors.

Snag and Log Habitat: Primary Cavity Excavators (PCEs)

Background

More than 80 species of wildlife use snags and living trees with defects (deformed limbs or bole, decay, hollow, or trees with brooms) in the interior Columbia River basin (Bull et al. 1997). The Blue Mountains of Oregon have 39 bird and 23 mammal species that use snags for nesting or shelter (Thomas 1979). The abundance of cavity-using species is directly related to the presence or absence of suitable cavity trees. Habitat suitability for cavity-users is influenced by the size (diameter and height), abundance, density, distribution, species, and decay characteristics of the snags. In addition, the structural condition of surrounding vegetation determines foraging opportunities (Rose et al. 2001). Not every stage of the snag's demise is utilized by the same species, but rather a whole array of species use the snag at various stages or conditions. Uses of snags include nesting, roosting, foraging, perching, courtship, drumming, and hibernating.

The Forest Plan identifies 15 primary cavity excavators as management indicator species (MIS) for the availability and quality of dead and defective wood habitat: Northern Flicker; Black-Backed, Downy, Hairy, Lewis's, Northern Three-toed, and White-headed Woodpeckers; Red-naped and Williamson's Sapsuckers; Black-capped, Chestnut-backed, and Mountain Chickadees; and Pygmy, Red-breasted, and White-breasted Nuthatches (Table 12).

Because these MIS were selected to represent dead and defective wood habitat, this analysis and discussion focuses primarily on that habitat component. Additional information on cavity-excavating birds' habitat associations, distribution and life history requirements is summarized in Mellen-McLean (et al. 2017). A key assumption is that if habitat is provided for PCEs, then habitat requirements for secondary cavity users will be met. Suitable nest sites are often considered the limiting factor for cavity nesting bird populations. Habitat for the white-headed woodpecker, and other species such as western bluebirds, was once quite common on the east side of the Cascade Mountains, but years of fire exclusion, along with selectively harvesting large old pine trees has greatly reduced this habitat to well below historic levels. Black-backed Woodpecker habitats, consisting of a range of green and burned forest condition, have also decreased at the regional level due to past timber harvest, firewood removal, and fire suppression, The highest regional increase is shown for three-toed woodpecker, which is associated with late seral subalpine and montane conifer. In general, populations of cavity nesting birds have declined across the Blue Mountains compared to historical conditions, primarily due to reductions in the numbers of large snags (Wisdom et al. 2000)

Table 12. Conservation status of cavity-nesting MIS

	Breeding Bird Surveys[1]		**Partners in Flight Database**[2]
Species	**Oregon**	**Reliability**	**BCR 10**
Black-backed Woodpecker	stable	yellow	**14**
Downy Woodpecker	stable	yellow	10
Hairy Woodpecker	stable	blue	10
Lewis's Woodpecker	no trend	red	**18**
Northern Flicker	decrease	blue	**13**
Northern Three-toed Woodpecker	No data		**13**
Pygmy Nuthatch	stable	yellow	**14**

Red-breasted Nuthatch	stable	blue	11
Red-naped Sapsucker	stable	yellow	**17**
White-breasted Nuthatch	stable	blue	8
White-headed Woodpecker	no trend	red	**18**
Williamson's Sapsucker	stable	blue	**17**
Black-backed Chickadee	stable	blue	**13**
Chestnut-backed Chickadee	stable	blue	11
Mountain Chickadee	decrease	blue	1

[1] Breeding Bird Survey - Increase = significant (p<0.05) increase from 1966-2009; Decrease = significant (p<0.05) decrease from 1966-2009; Stable = yellow or blue reliability and no significant increase or decrease; No trend = red reliability and no significant increase or decrease

[2] Partners in Flight - Regional Combined Scores can range from 5 to 25. Regional Combined Score > 13 may be a species of Regional Concern and are highlighted in bold.

LRMP standards

LRMP direction is to maintain snags and green tree replacement trees of ≥21" dbh, or whatever is the representative diameter of the overstory layer if it is <21" dbh, at 100% potential population levels of primary cavity excavators (U.S. Forest Service 1995). The LRMP used information from Wildlife Habitats in Managed Forests (Thomas et al. 1979; at least 2.25 snags >20" dbh per acre) to establish minimum snag guidelines. The model Thomas et al. (1979) used to generate snag densities addressed snags for roosting and nesting, but did not consider snags for foraging, and was never scientifically validated. More recently, several studies have shown these snag densities are too low to meet the needs of many primary and secondary cavity users (Bull et al. 1997, Harrod et al. 1998, Korol et al. 2002).

Consequently, the original standards for snags and down wood from Thomas et al. (1979) were replaced with the Regional Forester's Forest Plan Amendment #2 (U.S. Forest Service 1995). Bull et al. (1997) found the 2.25 snags/acre insufficient and that 4 snags/acre (2.8 are between 10-20" dbh and 1.2 are >20" dbh) is more appropriate as a minimum density required by primary and secondary cavity users for roosting, nesting, and foraging needs. Harrod et al. (1998) determined a range of historic snag densities for dry eastside forests between 5.9-14.1 snags/acre (5-12 are between 10-20" dbh and 0.9 to 2.1 are >20" dbh). Korol et al. (2002) determined that HRV for large snags (>20" dbh) for dry eastside mixed conifer forest with a low intensity fire regime was 2.9 to 5.4 snags/acre.

Rose et al. (2001) report that the biological potential models are a flawed technique. New information about the ecology, dynamics, and management of decayed wood has been published since then, and the state of the knowledge continues to change. However, until the LRMP is amended to reflect the new science, 100% biological potential is the minimum number of snags that need to be maintained through the life of the stand rotation.

Direction from the Eastside Screens requires that pre-activity levels of logs be left unless those levels exceed those shown in Table 13. Live green trees of adequate size must also be retained to provide replacements for snags and logs through time. Generally green tree replacements (GTRs) need to be retained at a rate of 25 to 45 trees per acre, depending on biophysical group. Pre-activity levels of logs should also be left unless levels exceed amounts specified in Amendment #2 (U.S. Forest Service 1995). Larger blowdowns with intact tops and root wads are preferred to shorter sections of tree boles.

Table 13 – LRMP standards for down wood[1] (U.S. Forest Service 1995).

Stand type	Pieces/acre[1]	Piece length	Diameter small end	Linear ft/acre
Ponderosa Pine	3-6	> 6`	12``	40`
Mixed conifer	15-20	> 6`	12``	140`
Lodgepole Pine	15-20	> 8`	8``	260`

[1] The table converts to about 0.4, 1.7, and 3.3 tons/acre for ponderosa pine, mixed conifer, and lodgepole pine,

The Decayed Wood Advisor (DecAID)

Integration of the latest science is incorporated into this analysis using DecAID Advisor (version 3.0) (Mellen-McLean et al. 2017) which is an internet-based summary, synthesis, and integration (a "meta-analysis") of the best available science: published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. In addition to data showing wildlife use of dead wood, DecAID also contains data showing amounts and sizes of dead wood across the landscape based on vegetation inventory data.

A distribution analysis (http://www.fs.fed.us/r6/nr/wildlife/decaid-guide/distribution-analysis-green-tree.shtml) was used to determine how close current conditions for dead wood on the landscape match reference conditions. Existing conditions for dead wood were derived by using Gradient Nearest Neighbor (GNN) data (LEMMA). GNN produces pixel-based maps with associated snags. These maps provide the direct data necessary to construct "current situation" histograms. GNN uses the same data that were used to develop the distribution histograms for DecAID. For more information see Ohmann and Gregory (2002), and go to the following web site: http://www.fsl.orst.edu/lemma/main.php?project=imap&id=home.

The analysis area for the distribution analysis is larger than the project area and encompasses the Upper Grande Ronde. The larger analysis area was needed to meet the minimum analysis area size of 12,800 acres per wildlife habitat type recommended by the authors of DecAID (Mellen-McLean et al. 2017).

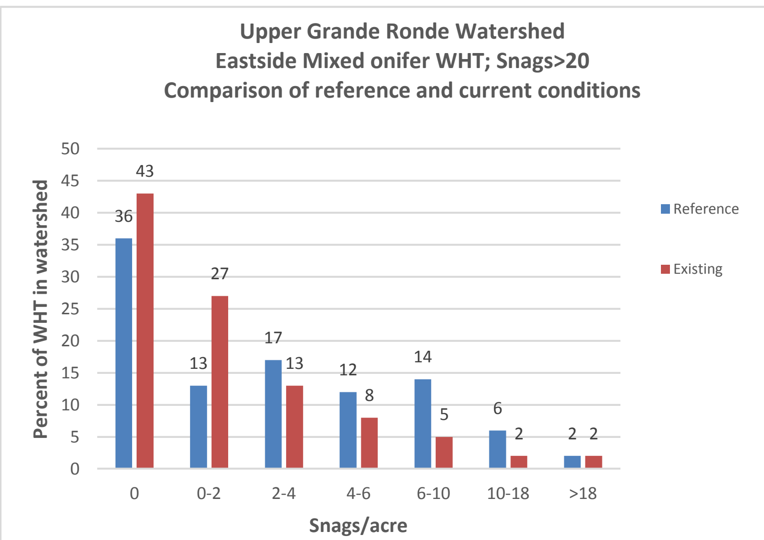
The distribution analysis results are then compared to the needs of woodpecker species using tolerance levels and intervals (range between 2 tolerance levels) from DecAID. A tolerance interval is similar to the more commonly used confidence interval but with a key difference: tolerance intervals are estimates of the percent of all *individuals* in the population that are within some specified range of values. In comparison, confidence intervals are estimates of *sample means* from the population of interest. For more information see "What is a Tolerance Level?" (http://www.fs.fed.us/r6/nr/wildlife/decaid/pages/What-is-a-tolerance-level.html) and Marcot et al. 2010.

An example of use of a tolerance level is as follows. If the 50% tolerance level for snag density at Pileated Woodpecker nest sites in a specific wildlife habitat type is 7.8 snags/acre, the interpretation would be that 50% of nest sites used by Pileated Woodpeckers in that habitat have < 7.8 snags/acre and 50% of nest sites used by Pileated Woodpeckers have > 7.8 snags/acre.

Existing Conditions of Dead and Defective Habitat

The Eastside Mixed Conifer (EMC) wildlife habitat types (WHT) occur in the analysis area. Results of the DecAID distribution analysis are displayed in Figure(s) 1-2. Tolerance levels for woodpeckers are displayed in Table 14.

Figure 1-2 – Comparison of reference condition to current condition for snag density classes in the EMC WHT portion of the Upper Grande Ronde Watershed. Figure 1 displays snags > 20" dbh; Figure 2 displays snags > 10" dbh. 50% tolerance levels for wildlife species are displayed on both figures. Reference condition derived from DecAID unharvested vegetation plots in the Blue Mountains (see analysis file); wildlife tolerance levels for green stands and post-fire habitat from Tables EMC_S/L.sp-22 and EMC_PF.sp-22 (Mellen-McLean et al. 2017).



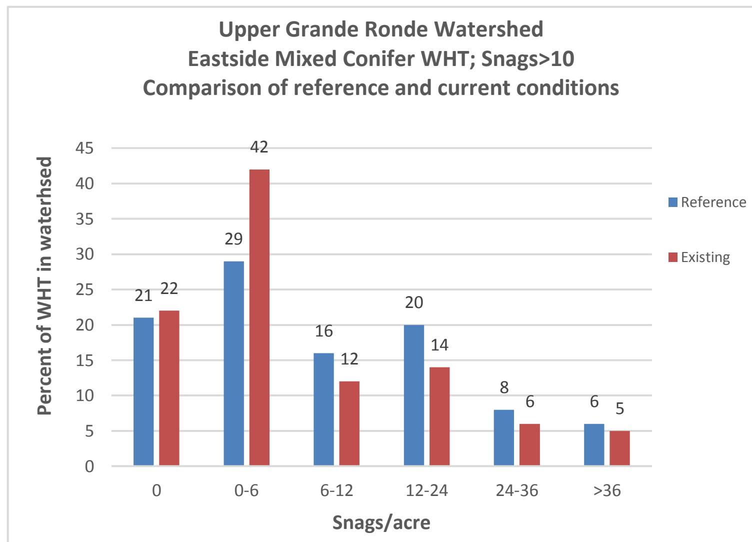


Table 14 – Tolerance levels for woodpeckers occurring in the EMC Wildlife Habitat Type (From DecAID Tables EMC_S/L.sp-22 and EMC_PF.sp-22)

Species	Snag density/acre for 30%, 50%, 80% tolerance levels >10" dbh	>20" dbh
White headed woodpecker	0.3, 3.9, 11.9	0.5, 1.8, 3.8
Pygmy nuthatch	1.1, 5.6, 12.1	
Black-backed woodpecker	2.5, 13.6, 29.2	0.0, 1.4, 5.7
Williamson's sapsucker	14.0, 28.4, 49.7	3.0, 8.4, 16.3
Pileated Woodpecker	14.9, 30.1, 49.3	3.3, 8.6, 16.6

Interpretation for EMC WHT

In the Eastside Mixed Conifer Wildlife Habitat Type (WHT), the landscape is deficit in snags density classes above 2 per acre for large (> 20" dbh) snags, as compared to reference conditions (Figure 2). Snag habitat for cavity-nesting birds is generally below reference conditions for densities of both large (>20") and small (>10") snags as more area is within the snag density class of 0 snags/acre than would be expected. In the higher density classes, especially the highest density classes, the area is currently below reference condition (Figure 1, 2). These snag density classes (in deficit) provide habitat above the

30% tolerance level for Pileated Woodpecker and Williamson's sapsucker. Large snag habitat for those two species may be limiting in this WHT and the 2 woodpeckers may be limited to more productive sites in this WHT where snag densities are expected to be higher (Bull et al. 2007, Ohmann and Waddell 2002). The amount of the landscape in the highest density classes for snags from unharvested stands (DecAID data) may be somewhat inflated due to an excess of dense stands with smaller trees susceptible to mortality than likely occurred historically. In addition, the data used in the calculation of reference conditions are from the late 1990s when spruce budworms were active in the Blue Mountains which created high levels of tree mortality.

There are pockets of high snag density within the project area, particularly in the southwest in the area of the Boundary Fire of 1996. The Boundary fire caused a dramatic, short-term increase in snag numbers, mostly in lodgepole pine and grand fir habitat. Snag habitat occurring within the fire area is serving as intermittent habitat for most cavity excavator species (Saab et al. 2004). The process of tree mortality and snag recruitment are balanced by the processes of snag decay and fall (Everett et al. 1999). It is estimated that about 75% of all snags may fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999), though field observations show many snags still standing. The effect of the Boundary fire was an immediate increase in snag habitat which has been followed by a slow reduction in available habitat.

Direct/Indirect Effects

ALTERNATIVE 1

This alternative retains the most snag habitat in the short-term and mid-term to the degree that snags would not be reduced for operational reasons, or consumed during prescribed burning as in the action alternatives.

Stands containing larger structure trees would continue to provide snag and down wood habitat to meet habitat requirements of primary cavity nesters at least through the short-term (15-25 years). In the absence of stand replacement fires, down wood levels would continue to increase. Stands within the analysis area that were logged in the early 1990s would begin to provide snag habitat in the long- term. Tree mortality in overstocked stands will increase fuel loadings, increasing the likelihood of stand replacement fires. This would benefit species like black-backed and hairy woodpeckers in the short term, but would reduce or eliminate habitat for pileated, white-headed, and downy woodpeckers less associated with fire.

ALTERNATIVES 2 AND 3

Non-commercial

Project activities will not remove any snags >12" except when they pose a danger to personnel. Non-commercial fuels treatments are not expected to negatively affect snag densities; though in the long-term pre-commercial thinning is expected to provide larger snags, similar to commercial thinning. Snags that are lost in prescribed burns are often replaced with new snags from trees killed during the fire.

Proposed fuels activities (removing small trees, retaining large trees, prescribed burning) are expected to help create habitat for PCEs using open forests with large trees in the long-term and reduce habitat for those PCEs using dense forests.

Prescribed burning creates a period of reduced "soft snag" habitat that persists into the early mid-term. This can cause wildlife species that depend on such structures, such as Pileated Woodpeckers, to move to other areas in search of suitable habitat, resulting in lower productivity and reduced local populations. Although burning would likely reduce the densities of snags and logs, the burn plan is designed to protect large snags through unit preparation and lighting pattern. The function of snag and log habitat in the analysis area is not likely to be compromised by burning given the considerations that are built into the prescription. Prescribed fire can create new snags and logs to replace some of the small to medium diameter material that may burn. However, newly created snags and logs are usually hard and not easily excavated.

Commercial

Four different types of commercial treatments are proposed for the Sheep Creek project area that are expected to affect future recruitment of snags. Models were run using the Forest Vegetation Simulator (FVS) looking at different treatments on different stands in the dry, moist and cold forest types to see the effects to snags comparing no treatment and treatment after 30 and 50 years.

All commercial treatments will reduce the density of snags on the landscape in the short and the long-term. Treatments are designed to improve the health of the stand, reducing competition, insect and disease mortality which in turn reduces snag recruitment. After 30 years, a treated area has a range of 9-28 snags/acre as opposed to 16-76 snags/acre in an untreated area, and after 50 years a range of 7-35 snags/acre is found in treated areas compared to 20-70 snags/acre in untreated areas. These ranges in the treated areas still meet the minimum thresholds for primary cavity excavators and still meet forest plan standards for ecologically appropriate numbers. With treatment, snag size tends to be larger than without treatment. The average dbh of snags in treatment areas after 30 years is 11.2" as opposed to 8.8" dbh. Fifty years after treatment, the average dbh in treated stands is 12" dbh compared to an average dbh of 10" in untreated stands. Treatments increase the growth rate of the remaining trees, thus increasing the amount of large trees in the mid to long-term, which will be beneficial to PCE's as large snags are limiting on the landscape in all wildlife habitat types except Ponderosa Pine/Douglas-Fir.

Each Alternative proposes differing amounts of commercial treatment and non-commercial treatments (Table 15). Alternative 2 proposes the highest amount of commercial treatments, 11% of the project area. This alternative would have the highest short-term negative effect on the overall density of snags in the project area but long-term would provide the greatest positive effect on large snag recruitment. Alternative 3 proposes the least amount of commercial treatments, 4% of the project area. This Alternative would have the least short-term negative effect on the overall density of snags in the project area, but would also have the lowest positive effect on large snag recruitment.

Table 15 – Comparison of proposed commercial and non-commercial treatments between Alternatives. Percentage is percent of project area

Treatments	Measure	Alternative 1	Alternative 2	The Alternative 3
Commercial	Acres % Project Area	0	3,367 11%	1,308 4%

Non-commercial	Acres % Project Area	0	8,231 27%	6,060 20%
Total Commercial/ Non-Commercial	Acres % Project Area	0	11,598 39%	7,368 24%
Prescribed Fire	Acres % Project Area	0	9, 521 32%	9,521 32%

Cumulative Effects

The list of past, present and foreseeable actions was reviewed to determine potential effects to dead and defective wood habitat. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman and BLM lands have been incorporated into the existing condition. Firewood cutting will continue to reduce available snags and logs, but the effect is limited to areas adjacent to open roads. Roads that are temporarily open for harvest activities will temporarily increase firewood cutting activities and snag densities in those areas will go down, though it is illegal to take snags > 21 inch dbh. Precommercial thinning activities on adjacent private lands would not directly affect current snag levels but are expected to reduce future snag densities and increase average snag diameter while still maintaining Forest Plan snag standards. Timber harvest on private inholdings is expected to continue at some level, with anticipated reductions of trees larger than 10" dbh and snag densities are expected to decline.

Conclusion

Current availability of snags in the project area indicate deficiencies in large snag densities within the Eastside Mixed Conifer Habitat Types, though habitat remains for all species at the 50% tolerance level. All proposed activities are consistent with Forest Plan and BLM Resource Management Plan standards and guidelines pertaining to primary cavity excavators. Timber harvest and prescribed burning under all action alternatives have the potential to decrease snag densities, but that impact is expected to be minor within the project area and the landscape as a whole.

Harvest treatments will result in lower levels of green tree recruitment, but recruitment levels meet Forest Plan standards and exceed recommendations (Bull et al. 1997, Harrod 1998). Stand density treatments in conifer stands are expected to enhance habitats for northern flicker, pygmy nuthatch, white-breasted nuthatch, and Williamson's sapsucker green tree habitats. Although treatments would improve habitats for these species within the project area, the effect to habitats Forest-wide would be minor considering that the project area encompasses only <1% of the Wallowa-Whitman acres. Proposed tree density reduction treatments would reduce risk to insect and wildfire disturbance on up to 11,598 acres within the project area, thereby reducing the potential for future pulses of habitat suitable for Lewis', hairy, and black backed woodpeckers. No alternative considered for the Sheep Creek project would affect population trends or viability for primary cavity excavator species at the Forest level.

Neotropical Migratory Bird Species

Background

A migratory bird is defined by the Migratory Bird Treaty Act of 1918 as any species or family of birds that lives, reproduces or migrates within or across international borders at some point during their annual migration patterns. They are a large group of species, including many hawks (*Buteo sp.*), shorebirds (*Charadriiformes*), flycatchers (*Muscicapidae sp*), vireos (*Vireonidae sp.*), swallows (*Hirundinidae sp.*), thrushes (*Turdidae sp.*), warblers (*Parulidae sp.*), and hummingbirds (*Trochilidae sp.*), with diverse habitat needs spanning nearly all successional stages of most plant community types. Nationwide declines in population trends for migratory species, especially neotropical migratory bird species (NMBS), have developed into an international concern. Recent analyses of local and regional bird population counts, radar migration data, and capture data from banding stations show that forest-dwelling bird species have experienced population declines in many areas of North America (Finch 1991). Habitat loss is the primary reason for declines.

The U.S. Fish and Wildlife Service (FWS) is the lead federal agency for managing and conserving migratory birds in the United States; however under Executive Order (EO) 13186 all other federal agencies are charged with the conservation and protection of migratory birds. This EO directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to protect birds and their habitat. The EO requires federal agencies to develop Memorandum of Understandings (MOU) with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporate migratory bird conservation into agency planning processes whenever possible.

The Forest Service implements management guidelines requiring the Forest Service to address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans (Executive Order 13186, 2001). To aid in this effort, the USFWS published *Birds of Conservation Concern 2008* (BCC 2008). The report identifies bird species with high conservation priorities. BCC 2008 uses current conservation assessment scores from three bird conservation plans: Partners in Flight North American Landbird Conservation Plan (PIF), the United States Shorebird Conservation Plan (USSCP), and the North American Waterbird Conservation Plan (NAWCP).

Bird Conservation Regions (BCRs) are used to separate ecologically distinct regions in North American with similar bird communities, habitats, and resource management issues. Species contained within the BCC are identified for each BCR. The La Grande District and majority of the Wallowa-Whitman National Forest (Wallowa-Whitman) is found within BCR-10, Northern Rockies.

Existing Conditions

BCR-10 includes the Northern Rocky Mountains and outlying ranges in both the United States and Canada, and the inter-montane Wyoming Basin and Fraser Basin. The Rockies are dominated by a variety of coniferous forest habitats. Drier areas are dominated by ponderosa pine, with Douglas-fir and lodgepole pine at higher elevations and Engelmann spruce and subalpine fir even higher. More mesic forests to the north and west are dominated by eastern larch, grand fir, western red cedar and western hemlock. In 2000, the Oregon-Washington Chapter of Partners in Flight published its Northern Rocky Mountains Bird Conservation Plan (Altman 2000). The plan provides conservation recommendations for the various species of landbirds that occupy the Oregon and Washington portions of the Interior Columbia Basin. For the Sheep Creek project, dry forest, mesic forest, subalpine forest and montane shrubland habitat exist. Formal surveys have not been conducted specifically for any of these species within the Sheep Creek analysis area, although terrestrial birds were monitored in the Blue Mountains from 1994-2011 as part of the U.S. Forest Service Avian Monitoring Program, as well as multiple annual breeding bird survey route through the La Grande and Baker districts (Sauer et al. 2011). Table 16 details migratory species of concern that may occur within the Sheep Creek analysis area and key habitat needs.

Table 16 – Migratory species of conservation concern identified within the Sheep Creek analysis area

Focal Species	Key Habitat Relationships	
	Vegetation Species	**Habitat Structure**
Dry Forest		
Flammulated Owl	Ponderosa pine, Douglas-fir	Old forest with grassy opening and dense thickets
Chipping Sparrow	Ponderosa pine	Short-statured herbaceous understory with scattered sapling pines
White-headed Woodpecker	Ponderosa pine	Large patches of late-successional forest with heterogeneous canopy cover
Moist Mixed Conifer Forest		
Townsend's Warbler	Grand fir, Douglas-fir	High canopy cover and foliage volume
Olive-sided Flycatcher	Grand fir	Open conifer forests (<40% canopy cover), edge and openings with scattered trees
Orange-crowned Warbler	Riparian vegetation, fir	Patches of a dense understory shrub layer, low canopy lift, and younger, more open stands
Williamson's Sapsucker	Grand fir, spruce, lodgepole pine	Large snags, coniferous trees, dead and downed wood
MacGillivray's Warbler	Grand fir, riparian vegatation	Patches of a dense understory shrub layer

Direct/Indirect Effects

ALTERNATIVE 1

There will be no direct adverse effects from Alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. Existing habitat would remain unchanged. The project area would continue to increase in risk to uncharacteristic insect outbreaks and fire that has the potential to degrade connectivity between watersheds, in light of the already reduced habitat conditions. Species that depend on dry forest, specifically old forest single-story habitat, would continue to experience suboptimal habitat.

ALTERNATIVES 2 AND 3

Both timber harvest and prescribed fire would occur in potential migratory bird habitat under all action alternatives. Thinning harvest treatments are expected to increase average stand diameter due to removal of trees primarily in smaller size classes, but across all size classes for Alternatives 2 and 3. Due to the possibility of minor snag reductions for logging safety, and potential consumption of downed logs and snags during post-treatment prescribed fire units, treatments that retain sufficient canopy closures are expected to degrade high-canopy closure habitat, but still function as habitat. Although some habitat elements could be reduced, sustainability of habitats is expected to increase as stand density reductions lower the risk of disturbance such as stand-replacement fire, especially in warm, dry forest types. Alternative 2 will treat more acres and will treat riparian habitat, whereas alternative 3 will not treat moist or cold upland forests and will not treat riparian zones. Species-specific impacts are listed in Table 17.

Table 17- Impacts to habitat of migratory species of conservation concern within the Sheep Creek analysis area

Species	Impacts to Habitat		
	No Action	Alt 2	Alt 3
Flammulated Owl	Potential source habitat would continue to be unsuitable due to high densities of small diameter trees.	Conversion of 2,960 acres to OFSS are proposed under this alternative. Treatments are expected to encourage habitat, by reducing densities of small diameter trees, encouraging the growth of larger trees and snags and creating heterogeneous openings of grassland. Proposed treatments would increase OFSS stands, but would still be well-below HRV.	Conversion of 1,229 acres to OFSS are proposed for treatment, meaning the under-represented OFSS that this species depends upon would continue to persist at levels well-below HRV.
Chipping Sparrow	Potential source habitat would continue to be unsuitable due to high densities of fir spp., out-competing shade-intolerant pine saplings.	Conversion of 2,960 acres to OFSS are proposed under this alternative. Although ponderosa pine saplings would be negatively impacted in the short-term, creating a more open canopy will allow this shade-intolerant species increased seed germination and recruitment into the sapling stage.	Conversion of 1,229 acres to OFSS are proposed for treatment, meaning the under-represented OFSS that this species depends upon would continue to persist at levels well-below HRV.
White-headed Woodpecker	Potential source habitat would continue to be unsuitable due to high densities of fir spp., out-competing shade-intolerant pine saplings.	Conversion of 2,960 acres to OFSS are proposed under this alternative. Large snags in the softwood stage are essential to nesting and will not be affected by this alternative unless individual trees pose a safety concern. Mature ponderosa that produce prolific pinecones provide important winter forage and will benefit from this proposed alternative by elimination of encroaching tree species that compete for resources with ponderosa.	Conversion of 1,229 acres to OFSS are proposed for treatment, meaning the under-represented OFSS that this species depends upon would continue to persist at levels well-below HRV.
Townsend's Warbler	High density stands will continue to provide nesting and foraging habitat.	Commercial treatment proposed on 3,367 acres within moist late-successional forest will reduce existing >70 canopy cover, though all >21" dbh trees will remain. Habitat is expected to be unsuitable for Townsend's Warbler until stand develops high canopy closure again. OFMS acres remain within HRV with this treatment.	Commercial treatment proposed on 1,308 acres within will reduce existing >70 canopy cover, though all >21" dbh trees will remain. Habitat is expected to be unsuitable for Townsend's Warbler until stand develops high canopy closure again.
Olive-sided Flycatcher	Suitable habitat condition would continue to be absent until suppression mortality created gaps and edge habitat.	Variable density thinning would create more diverse stand conditions and accelerates growth of larger trees that may become snags. Forest gaps would increase understory growth, contributing to increased insect production over the next 20 years. Increased forest edge habitat would also enhance foraging opportunities. Gaps created by thinning may allow foraging until the canopy eventually closes again and these opportunities are lost. Under Alternative 2 HPO (gap opening) thinning is proposed in 276 acres of moist and cold mesic forest.	Variable density thinning would create more diverse stand conditions and accelerates growth of larger trees that may become snags. Forest gaps would increase understory growth, contributing to increased insect production over the next 20 years. Increased forest edge habitat would also enhance foraging opportunities. Gaps created by thinning may allow foraging until the canopy eventually closes again and these opportunities are lost. Under Alternative 3 HPO (gap opening) thinning is proposed in 72 acres of moist and cold conifer forest.
Orange-crowned Warbler	Existing conditions would continue to provide habitat for this species due to an excess of UR compared to HRV.	1,250 acres of commercial and 3,949 acres of non-commercial cold upland forest habitat is proposed for treatment. Tree removal would create openings where shrub component for foraging and nesting could persist until the canopy cover increases and closes in 10 to 20 years.	418 acres of commercial and 2,767 acres of potential habitat is proposed for treatment. Tree removal would create openings where shrub component for foraging and nesting could persist until the canopy cover increases and closes in 10 to 20 years.

Species	Impacts to Habitat		
	No Action	Alt 2	Alt 3
Williamson's Sapsucker	Existing conditions would continue to provide suitable habitat for the Williamson's Sapsucker at the HRV, but important aspen habitat would continue to be encroached upon by conifer species.	The proposed action alternative would reduce dead and down materials, but will maintain a minimum of 7-15 tons/ac per project design criteria. 297 acres of riparian areas would be treated, addressing conifer encroachment issues. Large snags will be protected under this proposed alternative.	This alternative would have similar impacts of alternative 2, but would treat only 36 acres of riparian area.
Willow Flycatcher	Conifer encroachment within riparian zones would continue, precluding necessary shrub component from developing.	Alternative 2 proposes 261 acres of commercial and 36 acres of non-commercial treatments within identified RHCAs. Treatments will reduce density of conifers within riparian zones and encourage riparian shrub growth. And additional 115 acres of treatment within lodgepole pine and fir stands will encourage shrub growth.	Alternative 3 proposes treatment of 36 acres within riparian zones. Conifer encroachment within riparian zones would continue, precluding necessary shrub component from developing. Treatment within lodgepole pine and fir stands encouraging shrub growth will not occur.
MacGillivray's Warbler	Existing conditions would continue to provide habitat for this species due to an excess of UR compared to HRV.	Alternative 2 proposes 261 acres of commercial and 36 acres of non-commercial treatments within identified RHCAs. Treatments will reduce density of conifers within riparian zones and encourage riparian shrub growth.	Conifer encroachment within riparian zones would continue, precluding necessary shrub component from developing. Only 36 acres of riparian zone treated.

Cumulative Effects

Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands have been incorporated into the existing condition. Livestock grazing is expected to continue within the analysis area. Habitat improvements afforded by the action alternatives for chipping sparrow may also increase access of areas to livestock and brown-headed cowbirds. The potential for increase in nest parasitism is expected to be most pronounced in areas adjacent to existing cattle operations and agriculture on private lands along the southern boundary of the project area.

Timber harvest on adjacent private lands is expected to continue, with little availability of late and old forest structure and large snags anticipated. Therefore, habitat on National Forest lands will be increasingly important as habitat on private lands is reduced.

Conclusion

All action alternatives have the potential to directly impact migratory bird species, due to potential nest tree removal during the nesting season. The level of impact is unknown, but potential is highest for Alternative 2. The no-action alternative removes direct impacts, but maintains habitat conditions that favor high-density forest stands that may not be sustainable in the long-term and do not provide ideal habitat for species depending on open stands of mature ponderosa pine. Implementation of project design criteria reduces the potential for direct impacts to nesting land birds.

The action alternatives have the potential to directly impact neotropical migratory bird species due to potential nest tree removal during the nesting season. The no-action alternative removes direct impacts to this guild, but maintains habitat conditions that favor high-density forest stands that may not be suitable habitat or sustainable in the long-term. Implementing project work outside of nesting season limits the potential for direct impacts to nesting land birds. All action alternatives would decrease available moist OFMS with >70% canopy cover with Alternative 2 removing the most, though the results are still within HRV for OFMS.

The alternative 2 improves dry forest habitats by restoring old forest single-story structure, thereby benefiting land birds associated with this habitat type. It would decrease available moist old forest multi-story with >70% canopy cover. The proposed action alternatives will not affect population viability for any migratory bird species due little change within HRV values.

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